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RECLAMATION OF THE ZUIDER ZEE

IN a recent consular report from the Netherlands, issued by the Foreign Office, reference is made to a Bill which was introduced in the Second Chamber of the States General, for the purpose of obtaining authority to carry out the works required for the first portion of a scheme for reclaiming 800 square miles of land from the Zuider Zee, and for raising the necessary funds, estimated at forty million dollars, the cost of the entire scheme being put at about seventy-nine million dollars.

This scheme for adding land to the seven provinces of the United Netherlands is only a continuation of those bloodless conquests which Holland has been carrying on for the last twenty centuries, by which, little by little, the cultivated area of the country has been enlarged without annexation, or encroachment on neighboring countries.

Holland affords the most remarkable example of the operations of nature in that process of destruction and reconstruction of the earth on which we live that is always in process. The land is almost entirely composed of the off-scourings of Swiss, German and French territory washed off the land by the rain, transported several hundred miles by the rivers Rhine, Scheldt and Maas, and dumped by them into the North Sea, until a delta was formed and the shore advanced seaward 130 miles for a width of 60 miles. So long as the storms of the North Sea beat on this delta the fine particles of alluvium were washed away by the waves and carried to the still water of the deeper parts of the ocean, leaving only sand behind. The wind then became an active agent in the making of the land by

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lifting and transporting shorewards the material off the long stretch of bare sands exposed at low water, and gradually heaping it up in the form of sand hills, and constituting that long line of dunes which extends the whole length of the seaboard for 230 miles and forms the main protecting barrier of the land from the incursion of the sea during storms and high tides. The delta thus sheltered and protected became one vast warping ground over which the rivers continued to deposit their burden of rich alluvium, gradually building up a soil of marvelous fertility.

Through the surface thus raised the water poured into the delta found its way to sea through innumerable channels which finally concentrated in three main openings through the dunes. The surface thus became an amphibious country, half land and half water, divided by numerous channels into islands. At the time when historical records begin some of these islands had risen above the level of the tides, and the country consisted of large alluvial plains the great part below mean sea level, large meres or lakes from fifteen to twenty feet deep, and deep winding channels, the whole bordered by the higher plains on the south and east composed of sand and drift.

At this epoch man stepped in to gather the fruits of that which the contending forces of rain and rivers, storms and tempests, wind and tides had produced.

The Roman records afford some outline of the condition of Holland at this time, from which it is known that early in the Christian era the higher diluvial lands, dunes, and heaths were occupied by the Batavians, who gained a precarious living by hunting, fishing and pasturing cattle in summer on the alluvial islands.

Whether the first embanking and reclamation was done by the Batavians or by the Romans is uncertain, but records exist showing that the latter, recognizing the value of these rich lands for corn growing, commenced a system of reclamation by making more direct channels for the flood waters, and embanking the lands.

This system of reclaiming the land of the delta has gone on persistently ever since. At first only the higher lands were embanked, but as population increased the aid of science was invoked, and mechanical agency was applied to the raising of the water from the shallower meres and lakes, the motive power being wind. For four and a half centuries the fens and morasses, lakes and old river beds which had been converted into cultivated land were kept dry

by the aid of innumerable wind-mills studded all over the country, some of the deeper polders requiring three engines, at different levels, to raise and discharge the water. About sixty years ago steam power was added to that of the wind, being first used for the drainage of Lake Haarlem, by which 45,000 acres of rich land were recovered and a new province of 10,000 inhabitants added to the country. What was once a lake from fifteen to twenty feet deep is now the great market garden of Amsterdam. "And so by the skill and genius of man there was thus driven from the bosom of the country a most dangerous enemy, and a province was conquered without tears and without bloodshed, the engineer taking the place of the general, and the navvy that of the soldier."

Such is the physical history of the provinces of Holland known as the United Netherlands, which has a population of nearly five million and covers an area of 12,738 square miles, of which about two thirds consist of reclaimed lands, intersected by a system of main drains and navigable canals extending to a length of 2,050 miles. The annual budget for the maintenance of these drains and banks amounts to $2,500,000.

The land thus obtained has, however, only been held by one long-continued struggle between man and nature; the ocean attempting to regain the land over which it had dominion, and the rivers striving to break through the barriers that have been imposed on them, and the skill and perseverance of the Dutchmen being exercised in holding that which they had gained by the most careful guarding and watching.

For nearly twenty centuries the fight has been going on, from time to time the land being attacked both from the sea and land. At different periods the rivers, resenting the limits within which their waters have been restrained, have burst their bounds and flooded the country. This has generally happened after the breaking up of some great frost, when the water, flowing down in enormous volumes, has brought with it broken ice-drifts which, blocking in some bend or other obstruction, have stopped the progress of the flood. When this occurs the water finds relief by running over the top of the banks or breaking through them, covering thousands of acres and inundating villages and homesteads. Thus in the fifteenth century the Rhine burst its banks and flooded 100,000 acres and seventy villages. In another great flood nearly the whole of Holland was inundated and 400,000 lives were lost, the country being

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so depopulated owing to this vast loss of life that the damage done could not be made good, or the prosperity of the country restored, for many years.

Even more disastrous than the land floods have been the breaches made in the sand-hills and sea-dykes by abnormal high tides, due to gales lasting over several days, driving the water upon the shore. It was owing to one of these great storms, at the latter end of the thirteenth century, which lasted for several days, that the water of the North Sea was raised to an unprecedented height and driven by the northwest gale on the sand-banks which protected the north coast, breaking through these in several places, and inundating an enormous tract of country lying behind. By this breach the province of Friesland was separated from that of North Holland, and the water, uniting with Lake Flevo, formed the Zuider Zee, a vast inland salt-water sea eighty miles long and in places thirty miles wide. Remains of the original coast line exist in the islands of Texel, Vlieland, Terschelling, and Ameland. In the Zee the higher parts of the inundated land are now marked by the islands of Wieringen, Schakland, Marken and Urk, the latter of which is so little above the level of the sea that the greater part of it is covered with water whenever extraordinarily high tides occur, the houses and church standing on mounds slightly elevated above the rest of the island. Numerous villages, with their churches and homesteads, which once contained a numerous population, now lie buried beneath the waters of the Zuider Zee, and it is stated that 80,000 of the inhabitants lost their lives.

For more than six centuries the area then drowned has remained an inland sea, on which a numerous fishing population gains its living, the plough and the wagon having given place to the net and the boat.

The reclamation of Lake Haarlem having demonstrated the great advantages to be gained by such works, several schemes were subsequently brought forward for reclaiming the Zuider Zee and regaining what was thus stolen by the sea, the most extensive of these plans proposing the joining together of the islands which were left standing, and filling the gaps between them by embankments.

At last, in 1894, a Commission of twenty-seven members was appointed by the Government to make a thorough investigation of the subject, the commissioners being selected for their special capabilities for determining as to the practicability of the reclamation

from an engineering point of view, and as to the cost; as to the adaptability of the land for agricultural purposes, and its value when reclaimed; as to the proper way of dealing with the interests of the fishermen who would be displaced; and generally the advantages that would occur to the state. This commission has lately reported, and recently a Bill was brought before the Dutch States General for carrying into effect the recommendations of the commission. Owing to a change in the Ministry the Bill lapsed before it had passed through the necessary stages, but there is no doubt that it will be revived in due course by the new Ministry.

The idea of entirely reclaiming the whole of the Zuider Zee by uniting the islands has been abandoned as commercially impracticable, and a modified scheme adopted for only enclosing the inner portion by an embankment 18 miles in length, extending from the North Holland coast near the island of Wieringen to the Friesland coast near Piaam. The top of this embankment will require to be eighteen feet above mean high water, and it is proposed to construct in it two locks and six outfall sluices, giving a total waterway of 984 feet for the discharge of the water from the river Yssel. One of the locks is to be of sufficient size for sea-going craft, which will thus be able to get to Amsterdam through the locks at Schellingwoude and to other parts of Holland along the various canals that now have communication with the Zuider Zee. On the top will run a road and a railway. The estimated cost of this bank is $15,000,000. When the bank is completed it is proposed to reclaim two large areas on the west side which are now covered by water, containing together 131,450 acres, of which 115,000 acres will be available for cultivation, the remainder being occupied by roads, drainage canals, and banks. For the drainage of these reclaimed polders eight steam pumps will be required, of an aggregate capacity of 4,330 horse power.

Subsequently it is intended to reclaim two further tracts containing 365,283 acres, but this reclamation was not included in the Bill now under consideration. When this is done there will remain a large area of water, practically the site of Lake Flevo, covering 560 square miles. It is considered that the depth of the water in this lake is too great for profitable reclamation. The cost of enclosing the two tracts of land and providing the necessary pumping machinery is estimated at $14,812,500. For the interests of the fishery $1,875,000 is allocated; for military defences, $3,330,000 for deepen-

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ing the approaches to the harbors and other works in the interests of the navigation, $3,585,000, making, with the cost of the bank, a total estimated cost of $38,602,500. The enclosure of the eastern polders, containing 365,288 acres of cultivatable land, is estimated at $39,312,000, making a grand total of $77,915,000.

The enclosing dyke is reckoned to occupy nine years; the reclamation of the western polders would be completed at the end of fourteen years, and it would take thirty-three years before the whole reclamation could be completed.

It is proposed that the cost of the works shall be repaid by annual installments spread over sixty years, requiring an annual charge of $833,335. The renting value of the reclaimed land is estimated at $1,150,000 a year, showing an annual financial gain of $316,665.

It is considered that, even if no financial gain should ensue, the scheme is one that will be of eminent advantage in the increase in the general prosperity: by creating a better condition of the Waterstaat over a considerable portion of the country, and in effecting a large saving in the cost at present incurred in pumping; and in the maintenance of the sea banks, the length of which will be reduced from 198 to 25 miles; by the establishment of direct communication by road and railway along the new bank between North Holland and Friesland, which will shorten the distance between Leuwarden and Amsterdam 35 miles; and, above all, by the economic advantages that will be derived from the cultivation of a very extensive tract of land, and the employment that will be given to a very large population.—Adapted from *Nature*, January 23, 1902.

WINTER ARIDITY INDOORS

BY M. S. W. JEFFERSON, PROFESSOR OF GEOGRAPHY, STATE NORMAL COLLEGE, YPSILANTI, MICHIGAN.

THE very interesting paper by Professor Ward in the September JOURNAL OF GEOGRAPHY suggests arithmetical treatment to show the actual quantities of water demanded in connection with a heating and ventilating plant to preserve a healthful humidity within doors in winter.

On the average of the twenty-one days of Professor Ward's observations, an outside temperature of 36° F. was accompanied by a relative humidity of 71 per cent. There were present then in each cubic foot of air 1.77 grains of water vapor. This was warmed within the house to a temperature of 69° and then showed a relative humidity of 30 per cent. Corresponding to these figures is a water vapor content of 2.32 grains per cu. ft., showing an increase in the absolute water present of 0.55 grain per cu. ft. which must be credited to the water pans used in connection with the heating apparatus.

To obtain what we might call a healthful humidity, of say, 70 per cent. at 70° F., 5.59 grains of water are needed to the cu. ft. There was a deficit of water vapor then in the room examined to the amount of 3.82 grains per cu. ft. It appears, therefore, that the water pans supplied little more than one-seventh as much water as was needed for proper humidification, if the standard set of 70° F. and 70 per cent. humidity be a proper one.

Knowing the quantity of air supplied per minute by a heating plant, it is a simple matter to estimate the amount of water that should be evaporated and added to air of given outside temperatures and humidities.

Clearly we are best off in winter in this respect when the outside air is saturated. Suppose an outdoor temperature of 40°. At saturation there are present 2.85 grains of water to the cu. ft. If a heater raises this air to 70° without adding to its water content, it will become drier as failing to increase its water along with its temperature. In other words, to maintain saturation at 70° F. needs 7.98 grains of water to the cu. ft. and having still but 2.85 it is said to have only $2.85 \div 7.98$, or 36 per cent. enough water to saturate it. Its relative humidity, therefore, is 36 per cent. For the 70 per cent. humidity assumed as a desirable standard, we need $0.70 \times 7.98 = 5.59$ grains of water. The heating apparatus should therefore add 2.74 grains of water at the same time as it raises the temperature in order to produce the desired humidity. This additional 2.74 grains is a minimum quantity, however, since we have assumed the favorable case of saturated outer air. Had the outer air contained the average 69 per cent. of Professor Ward's table, the water vapor present would have been only 0.69×2.85 or 1.97 grains per cubic foot and the additional water needed to obtain the

desired humidity would be 3.62 grains. Table A gives the relative humidities that would result from raising to 70° F. without adding water, outer air at various temperatures, from 0° to 50° and relative humidities from 60 to 100 per cent.

TABLE A.

Outside Temperature.	Outside Humidities. 60. Inside Humidity, Per cent.	80. Inside Humidity, Per cent.	100. Inside Humidity, Per cent.
0°F.	4	5	6
10	6	8	10
20	9	12	16
30	14	19	24
40	21	29	36
50	31	41	51

The number of grains that should be added in each case to bring the humidity up to 70 per cent. when air has been raised to 70° is given in similar form in Table B.

TABLE B.

Outside Temperature.	Outside Humidities. 60. Grains of Water to cu. ft.	80. Grains of Water to cu. ft.	100. Grains of Water to cu. ft.
0°F.	5.30	5.21	5.11
10	5.12	4.97	4.81
20	4.85	4.60	4.35
30	4.43	4.04	3.65
40	3.88	3.31	2.74
50	3.14	2.33	1.51

This table is a somewhat precise expression of the fact that the drier and colder the air outside, the more intense and unwholesome the indoor aridity that results from heating air without humidifying it, and the greater the demand on any humidifying arrangement for water to compensate the effect of raised temperature. According to Chamber's Encyclopedia, "Ventilation" requires a supply of 20 to 30 cubic feet of air per minute per individual. Let us say 25 feet per minute then, or 36,000 per day of 24 hours. To find the daily need of water corresponding to that air supply per individual, we multiply the grains per cu. ft. of Table B by 36,000, and divide by 14,600, the number of grains to a quart, giving us Table C with quarts of water per day per individual needed to correct the

aridity of air that has been raised to 70° from the outside conditions tabulated.

TABLE C.

Outer Temperature.	Outside Humidities. 60. Quarts of Water Daily per Individual.	80. Quarts of Water Daily per Individual.	100. Quarts of Water Daily per Individual.
0°F.	13.7	12.8	12.6
10	12.6	12.2	11.9
20	12.0	11.3	10.7
30	10.9	10.0	9.0
40	9.6	8.2	6.8
50	7.7	5.8	3.7

From this table it appears that under the average conditions of Professor Ward's twenty-one days, about two gallons of water per individual should be evaporated to humidify his daily supply of air. A family of five persons would need ten gallons of water evaporated daily for the same purpose, and a schoolhouse 200 gallons of water daily per 100 pupils. If the air supply assumed at 25 cu. ft. per minute be not an actual quantity, it is simple to assign the proper proportionate value for any known rate of air supply. We might cut down a school supply by reducing the hours allowed for daily use from 24 to 9, corresponding to a drop from 200 gallons per 100 pupils to 75 gallons daily. On the other hand, Professor Ward's instructive observations were far from approaching the extremes met any winter in American houses, as his coldest outside temperature mentioned is 23° and least outside humidity 51 per cent. From Table A we learn that zero temperatures with a humidity of 60 per cent. means an inside humidity of 4 per cent. if the air is raised to 70° F. without addition of water. Even adding the maximum amount supplied by Mr. Ward's water pans in any day (Nov. 11), 1.18 grains, we yet have a relative humidity of only 18.4 per cent. If it is true that a cold spell makes it hard to keep up to 70°, it is also true that we suffer in the defect of temperature, and also the outer air may commonly have a humidity far below 60 per cent. W. M. Davis says (*Meteorology*, p. 145) we may have as low as 30 per cent. in our winters. Ultra-desert conditions undoubtedly occur within doors every winter.

GEOGRAPHY IN GERMANY. II. THE UNIVERSITY

BY J. RUSSELL SMITH.

GEOGRAPHY is in much higher regard as a university study in Germany than in England or America. The professor of geography is an exception in the universities of English-speaking lands. In German-speaking universities he is the rule. The status of geography in the higher institutions of learning in the different countries is shown by the following table compiled from Hermann Wagner's *Geographisches Jahrbuch* for 1901, and showing the number of universities offering geography, and the number of instructors of university grade occupying themselves with lines of work classified as geographic.

TABLE NO. 1.

	Number of Institutions.	Number of Instructors.
All countries	107	187
Germany	24	40
France	31	45
United States	6	6
England	4	9

This table does not cover the whole field. It classifies merely the titles of the instructors. There are in the United States many men giving courses in geography while occupying a position with some other title. The same is true in Europe. In the German-speaking universities in the summer of 1902, 93 men were giving courses in geography, and of these, 66 were in Germany, 19 in Austria and 6 in Switzerland.

In the higher education of Germany the importance of instruction in geography is comparatively new, but the position of the science seems to have been attained without loss of prestige; the geography professor is held in just as high esteem as are his colleagues and his pay is as good as theirs. The lectures are on the whole well attended, just how well it is impossible to say for the university publications give only the names of the students and a loose classification of the general courses they are taking. Statis-

ties of lecture attendance could not be compiled without the co-operation of the professors giving the lectures. It would be difficult for the professors themselves to tell how many hearers they have for there is no roll call in the German university, and the number of students paying for a course bears a very uncertain relation to the number who hear the lectures. The list of doctors' theses that appear in the field of geography is also a poor index to the number studying geography because the theses show the number of specialists, while geography is one of the general culture subjects, and, like history, is taken a part of the time by many students in other fields. The writer has often met philologists and even chemists who are taking courses in geography because it interested them and they liked the professor. Geography lectures are no exception to the general rule in the German universities; the attendance depends chiefly upon the personality of the professor. In Leipzig, Professor Friedrich Ratzel's lectures have a larger attendance than any other lectures in the university.

The German conception of geography is a broad one, and it can perhaps be best obtained by examining the titles of the courses in geographical instruction offered in the leading universities. Leipzig and Berlin have been selected, and the accompanying lists of titles were chosen from the university catalogues and published in *Petermann's Mitteilungen* under the title "The Geographical Instruction in the German Hochschulen* in the Summer Semester 1902 (Including Related Subjects)."

It will be very instructive to American readers to see the wide variety of courses offered in geography and allied lines in the German universities. The following announcements of courses explain themselves:

COURSES IN GEOGRAPHY AND ALLIED SUBJECTS OFFERED IN THE UNIVERSITY OF BERLIN IN THE SUMMER SEMESTER 1902.

Professor Richthofen, History of Geography, 4 hrs. (per week); Geographical Discussions, 2 hrs.

P. D. (Private Docent) Meinardus, Elements of Earth Physics, 2 hrs.

P. D. Kretschmer, Science of Map Making with Practical exercises, 2 hrs.

* The term "Hochschulen" may be rendered "higher institutions of learning." It includes the universities and the best technical schools.

Professor Sieglin, (1) Explanation of Tacitus' Germania, 2 hrs.; (2) Exercises in the Seminar for Historical Geography: Exposition of Strabo, Book VIII. (Geography of Greece), 2 hrs.

P. D. Oncken, Exercises of the Seminar for Historical Geography: The German Territories from the Treaty of Westphalia to the fall of the old Empire, 2 hrs.

P. D. Streck, Exercises of the Seminar for Historical Geography: Geography of Palestine, 2 hrs.

Professor Luschan, (1) Anthropology with especial attention to Physique, with Demonstrations, 2 hrs.; (2) Ethnology of South Africa with especial attention to the German Sphere of Influence, with Demonstrations in the Ethnological Museum, 1 hr.; (3) Anthropological Discussions, 2 hrs.; (4) Anthropological exercises with special attention to photography and other methods of reproduction, 4 hrs.

P. D. Ehrenreich, Ethnography of South America with Demonstrations in the Ethnological Museum, 2 hrs.

Professor Seler, History of the Discovery and conquest of Mexico, 2 hrs.

Professor Helmert, Measuring of Elevations, 1 hr.

P. D. Marcuse, (1) Theory and Use of Astronomical Instruments especially for the Purpose of Geographic Location, with Demonstrations, 1½ hrs.; (2) Discussion of Selected Chapters from Mathematical Geography and Nautical Astronomy, 1½ hrs.

Professor Bezold, Theoretical Meteorology (Thermodynamics of the Atmosphere), 2 hrs.

P. D. Weinstein, Physical Properties of the Earth, 1 hr.

P. D. Gillig, The Cultivated Plants; Their History and Distribution, with Demonstrations, 2 hrs.

P. D. Marburg, The Cultivated and Useful Plants, with Demonstrations, 2 hrs.

P. D. Ballod, General Industrial Statistics, 2 hrs.

Professor Böckh, General Theoretical Statistics, 2 hrs.

Professor Schmitt, History of the Sea Power and Colonial Policy of England, 1 hr.

Courses Offered in the University of Leipzig.

Professor Ratzel, (1) Biological Geography and introduction to Anthropological Geography, 3 hrs.; (2) Political and Industrial Geography of Extra European Countries; (3) Geographical Semi-

nar: Papers by Advanced Students on Topics in Anthropological and Biological Geography, 1½ hrs. General discussion of the papers by members of the seminar.

Professor Berger, (1) Survey of the Period of the Great Geographical Discoveries, 2 hrs.; (2) Historico-geographic Seminar; Exposition of the 2d Book of Pliny's Historia Naturalis, 1½ hrs.

Professor Weule, (1) Importance of the Pacific Ocean in the History of the Human Race, with Demonstrations in the Ethnological Museum, 2 hrs.; (2) History of Primeval Man with especial attention to European Peoples, with Demonstrations in the Ethnological Museum, 1 hr.; (3) Papers and Discussions on Selected Topics in Ethnology, 1 hr.

P. D. Kötschke, Introduction to the Literature of Travel Description: Reading of selected passages. (From Marco Polo to the Eighteenth Century.)

P. D. Friedrich, (1) The Most Important Commodities of the World's Trade, 2 hrs.; (2) Geographical Seminar (authorized by the Director*); Exercises in Map Drawing, 1 hr.; The Most Important Commodities of the World's Trade, papers by Beginners, 1 hr., by advanced students, 1 hr.

Professor Guthe, Geography of Palestine, 2 hrs.

Professor Conrady, (1) Outline History of Chinese Civilization, 1 hr.; (2) The Neighbors of Ancient China, from Chinese Sources, 1 hr.

Professor Peter, Practical Course for Geographers in Astronomical Location of Places.

Professor Credner, Geological Structure of the Kingdom of Saxony (Province of Erzgebirge), 1 hr.

Professor Carus, Geographical Distribution of Animals, 2 hrs.

Professor Hasse, (1) Introduction to the Study of Statistics, 2 hrs.; (2) German Colonial Policy, 2 hrs.

The fact that these lists, varied though they be, were published in the leading German geographical journal under the editorship of one of the great geographers, gives them an authoritative standing in the matter of definition. The lists show the close association between history and geography, and the importance of life in the science and especially human life. Development along the biological and human side has been one of the marked tendencies of the recent period. It is also quite suggestive to note that the Germans

* Professor Friedrich Ratzel.

have coined the word "Erdkunde" as a substitute for geography. The two terms are often used synonymously but Erdkunde has wider meaning and will, for example, include geology.

TABLE II.

COURSES IN GEOGRAPHY AND "RELATED SUBJECTS" OFFERED IN THE GERMAN UNIVERSITIES IN THE SUMMER SEMESTER, 1902.

	Descriptive Geography.	Geology.	Geographical Seminar.	Cartography with Practice.	Mathematical Geography.	Ethnography.	Meteorology.	Physical Geography.	Anthropology.	Zoological Geography.	Botanical Geography.	Historical Geography.	The World's Trade.	Commercial or Industrial History.	Statistics.	Colonial History or Policy.	Methods of Teaching Geography.
	D.	G.	S.	C.	X.	E.	M.	P.	A.	Z.	B.	H.	W.	CH.	St.	Col.	T.
Berlin.	D.	G.	S.	C.	X.	E.	M.	.....	A.	.....	B.	H.	.....	.....	St.	Col.	.....
Bonn.	D.	G.	S.	C.	.....	.....	M.	.....	A.	.....	B.	.....	W.	CH.	St.	.....	.....
Breslau.	D.	G.	S.	.....	X.	E.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Erlangen.	D.	G.	S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Freiburg.	D.	G.	S.	C.	.....	E.	.....	.....	.....	.....	.....	.....	.....	.....	.....	Col.	.....
Giessen.	D.	G.	S.	C.	.....	.....	.....	P.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Göttingen.	.....	G.	S.	C.	X.	.....	.....	P.	.....	.....	.....	H.	.....	.....	.....	.....	.....
Greifswald.	D.	G.	S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Halle.	D.	G.	S.	.....	.....	E.	.....	.....	.....	.....	.....	.....	.....	CH.	.....	.....	T.
Heidelberg.	D.	G.	S.	.....	.....	.....	M.	.....	.....	.. ..	.....	.....	W.	.....	.....	.....	.....
Jena.	D.	G.	S.	.....	X.	E.	.....	.....	A.	.....	.....	.....	W.	CH.	St.	Col.	.....
Kiel.	D.	G.	S.	C.	.....	.....	M.	.....	.....	.....	.....	.....	.....	.....	.....	Col.	.....
Königsberg.	D.	.....	S.	.....	X.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leipzig.	D.	G.	S.	C.	X.	E.	.....	.....	.....	Z.	B.	H.	.....	.....	.....	Col.	.....
Marburg.	D.	G.	S.	.....	X.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Münich.	D.	G.	S.	C.	X.	.....	M.	.....	A.	Z.	.....	.....	.....	.....	St.	Col.	.....
Rostock.	D.	G.	S	.....	X.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Strassburg.	D.	G.	S.	.....	X.	E.	.....	P.	.....	.....	.....	.....	.....	.....	.....	Col.	.....
Tübingen.	D.	G.	.....	.....	.....	.....	.....	P.	.....	.....	.....	.....	.....	.....	.....	Col.	.....
Würzburg.	D.	G.	S.	.....	X.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Table No. 2 gives another view of the German idea of geography by showing in tabular form the kinds of courses being given at one time in all the universities of Germany. This general view is for the summer of 1902 and it cannot be taken as accurately descriptive of the different universities, for there are considerable changes from semester to semester, and the abbreviation necessary for tabulation takes so much of the individuality from the titles* that the

* Any one desiring more detailed information on this point can now find in *Petermann's Mitteilungen*, twice a year, the full titles of all courses in geography and "related subjects" in all German-speaking universities.

table can have no further value than as an indicator of the scope of the work and the amount of attention given to it in the different universities.

Under the heading "Descriptive Geography" the courses are usually devoted to some particular part of the world as Asia, France, Germany, but the instructor sometimes gives himself more latitude by using the title "General Geography" or "General Erdkunde." The mathematical geography most frequently given is the measuring of altitudes, the determination of latitude and longitude, and other preparation for geographic exploration. The table shows the fundamental importance that is accredited to descriptive geography, to geology and to a seminar where the students present papers, usually parts of their theses. Map making and mathematical geography are also shown to have important places. Further than that the table shows the specialties of different universities, although it unfortunately does not show the different degrees of emphasis laid upon descriptive geography and geology. Bonn, for example, has two professors and several courses in geology. The German interest in colonial questions is reflected in the number of courses on colonial policy.

If table No. 2 had been extended to include the German-speaking universities of Switzerland and Austria, it would have shown that three Swiss and five Austrian universities are fully up to the average of those in Germany itself. The University of Vienna stands in the first rank, being on a par with Berlin and Leipzig in the number of courses offered.

Geographical instruction is also common in the technical schools of Germany; *Petermann's Mitteilungen* reports courses in ten institutions of this class. Here the strongest emphasis is laid upon mathematical geography. Eight of the ten offered courses in this field, and only two had seminar courses. Seven had courses in geology, six in descriptive geography, four in map work, three in meteorology and one, Munich, had a course on international trade and another in commercial history.

Before we can fully understand the situation of geography in the German university, we must consider the German ideal of the geography professor. Like all other professors, the measure of his greatness is taken in terms of his contributions to science, the books he has written, not in his ability as a teacher. Consequently his lectures, like those of the other professors, are frequently but

the ill-arranged scraps of knowledge that are being or will be digested and shaped for the forthcoming book. Sometimes the book has been published, but even that may not suffice to make well-arranged units of the lectures.

The generally recognized head of German geographers is the great geologist-geographer Richthofen, the explorer of China, and now professor at Berlin. His rival in renown and possibly his peer is Friedrich Ratzel of Leipzig—geographer and ethnographer. Far below these in rank is Kirchhoff of Halle, a man of another type, secondary rather than original, but standing high because of his pedagogical abilities.

The activities of these three men are in a measure indicated by the lists of the different courses that they have recently given.

Professor Richthofen, now advanced in years, gives each semester two hours of "colloquium" and one course of lectures. The list of courses appended extended through the last seven semesters without repetition.

Lectures by Professor Richthofen: Geography of Mediterranean Lands, 4 hrs.; Morphology of the Earth's Surface, 2 hrs.; Geography of Western Asia, three times, 2 hrs. each; Geography of Sea Coasts, 4 hrs.; Geography of Eastern Asia, 4 hrs.; The History of Geography, 4 hrs.

Professor Kirchoff conducts a seminar for *Erdkunde*, and in the last four semesters has given the following variety of courses, lecturing about eight hours per week. The first four courses represent one semester's work. The lectures on Palestine, and the quiz on political geography are regular features, each coming every alternate semester.

Lectures by Professor Kirchhoff: General Erdkunde, 4 hrs.; North Central Europe, 1 hr.; Geography of Palestine to illustrate Bible History, 1 hr.; Methods of Geography and Geographical Teaching; Recent Developments in Geography and Ethnology, 1 hr.; Europe other than Middle Europe, 4 hrs.; Quiz in Political Geography, 1 hr.; Selected Sections from Anthropological Geography, 1 hr.; Asia, 4 hrs.; South Central Europe, 1 hr.; Darwinism especially applied to the development of peoples, 1 hr.; Australia, America and Africa, 4 hrs.

Professor Ratzel regularly conducts a seminar, usually in some prescribed field, but the variety of work done in a term of years is as varied as his lecture courses. In the last eleven semesters

he has delivered the following twenty courses of lectures with only seven repetitions, a total of tweny-seven courses given.

Lectures by Professor Ratzel: The Extra European Countries Politically and Industrially Considered, 4 hrs.; Biological Geography and Introduction to Anthropological Geography, 3 hrs.; Commercial Geography, 4 hrs.; Seas, Rivers and Lakes, 2 hrs.; The Scientific Basis for the Judging of Peoples, 1 hr.; General Erdkunde, Part I., Islands and forms of Land, 4 hrs.; Contemporary Countries and Peoples of Europe with Especial Attention to Political and Industrial Conditions, 3 hrs.; Introduction to the Study and Teaching of Geography; Methods and History of the Newer "Erdkunde," 4 hrs.; Germany and German Central Europe, 2 hrs.; General Erdkunde, Part II., Oceanography and Climatology, 4 hrs.; The Extra European Countries and Chief Centers of International Trade in Their Political and Industrial Relationship to Germany, 2 hrs.; The Basis of Landscapes (illustrated); General Erdkunde, 1st half, Introduction, Morphology, Hydrology with Illustrations, 4 hrs.; France, 3 hrs.; Basis of Political Ethnography, 1 hr.; The Mediterranean Sea and Mediterranean Lands, 2 hrs.; Landscapes and Cities of Middle Europe, 1 hr.; Anthropological Geography; The Alps and Related Mountains; England's World Power and World Policy.

In 1901 Professor Ratzel's students held a celebration in honor of his completing the twenty-fifth year of his professorship. They also prepared and published a list of his writings. Nothing could better describe the scope of his learning, the extent of his activities, or the goal that the highly successful professor may reach. His writings were classified under the following headings, leaving small chance for duplications: Natural Science, 4 vols., 1 contributed article;* General Geography, 11 vols., 10 contributed articles; Ethnography, 6 vols., 14 contributed articles; Anthropological and Biological Geography, 6 vols., 15 contributed articles; Physical Geography, Mountains, Névé and Snow, 4 vols., 6 contributed articles; Landscape Science, 8 contributed articles; Biography and History of Erdkunde, 19 contributed articles; School Geography and Related Subjects, 1 vol., 1 article; Questions of the Day and General Topics, 1 vol., 8 articles; total, 33 vols., 82 articles.

* These articles were usually published in some of the scientific journals with which Germany abounds.

The student and his work are a necessary part of this presentation. The typical German student begins his university work at an age of nineteen or twenty after the rigorous forced march and drill work of the gymnasium, where he has had little or no opportunity to exercise individuality or choice in the selection of electives. He is suddenly thrown entirely upon his own resources to shape his course and work or play as he pleases, the only check upon him being the examination that precedes the giving of degrees, and the requirement that he must be examined in three subjects. A large proportion, probably a majority, of the students who attend the geography lectures, do so with no idea of making practical use of the knowledge so gained or of passing examinations in the subject. They simply sit through the lectures, many not even taking notes. Another portion, the real geography students, usually follow the lectures with close notes, prepare and discuss papers in the seminar courses and study diligently in the special libraries prepared for them. The thesis for the degree of Doctor of Philosophy is carefully worked out, but it is often on some rather small point and is quite as likely to be concerning the history of geography or a geographer as a contribution to geography itself. The German Doctor's degree (at least in many branches) does not have the seriousness or the finality that attaches to the same degree in the best American universities. The real and dreaded test for the German is the state examination which he must pass before he can enter upon the practice of the learned professions.

The avowed aim of the German university is original research and the professors do a great deal of it, but the students labor under certain disadvantages. Their previous training, the general atmosphere of a bureaucratic and military government, the spirit of orderliness and obedience in the people—all these conspire against originality on the part of the students. The young man is characterized by the obedient spirit of the disciplined private soldier, rather than the spirit of coöperative individuality. "It is better," say the students, "to have a thesis subject given." You will get along better with the professors, and this too when the professors know little or nothing of the student and his particular abilities. There is almost no provision for the professor to know the student and it is not possible while the number of professors is so small in proportion to the number of students. The ratio of stu-

dents to professors is considerably greater in German universities than in our own American universities.*

University.	Teachers.	Students.
Leipzig	211	3,793
Tübingen	97	1,376
Cornell	325	2,515
University of Pennsylvania	265	2,573

The attitude of the average student is well shown by the following incident. The writer sat in a German geographical seminar library tabulating the courses shown in table No. 2. The queer-looking paper attracted the attention of two German students who entered. One was the son of a professor in another university and both were nearing their doctor's examination. They asked the tabulator what he was doing. After a brief explanation they both exclaimed in one breath, "Why, that is a good thing, but *who told you to do it?*" To them it was a "good thing," an exercise of imitation, therefore some professor must have suggested it.

But if perchance the German student does possess originality, it will probably be recognized; the university gives him abundant opportunity to exercise it, and the number of students far exceeds the total number doing post-graduate work in America. The reward for the German scientist is great honor and esteem. Germany leads in science because the professors in her universities are free to strive for this honorable position. They are relieved of all administrative duties, and the few rather perfunctory lectures they give are small hindrance to the real pursuit of life—the writing of books and the pursuit of science.

DESTRUCTION OF HAILSTORMS WITH CANNON†

CONSIDERABLE interest has been aroused among agriculturists in the United States relative to the prevention of hailstorms by the use of explosives fired from specially designed cannon. The experiments conducted along this line by grape

* The following comparison for two American and two German universities is made on the basis of professors, instructors and assistants for the American, and of professors and private docents for the German.

† From the report of the U. S. Weather Bureau for the year ending June 30, 1901.

growers of France and Italy have aroused popular interest in this country. The theory is not a new one, though perhaps not so ancient as the idea that precipitation occurs soon after and as a result of the explosives used in battles. As early as 1769 the Marquis de Cheviers, a retired naval officer of France, thought that he could combat the scourge of hailstorms by the firing of cannon, but his experiments, like those conducted by many others at various times during the past century, were not productive of definite results.

One of the most serious drawacks to grape culture in Europe is the destruction caused by hail, and the growers are naturally interested in anything that promises to give immunity from such damage. During the past two or three years renewed interest has been taken in the matter by the vineyardists of certain parts of France and Italy. Several manufacturers have placed upon the market a special form of cannon, which they claim will effectually break up hail-bearing clouds. The belief in the efficacy of this method of protection has become quite general in Europe, although scientists versed in the physics of the air have not expressed confidence in the system.

In brief, the apparatus in use consists of a cannon fitted with a funnel-shaped conical extension. The difference between the various forms of cannon that are used lies mainly in the shape and size of the funnel extensions and the size of the powder charges. Usually the cannon are fired vertically upward, although in some instances the apparatus is inclined toward an advancing cloud. The effect of the funnel attachment is to cause the formation of a mass of rapidly-revolving air, or vortex, which leaves the mouth of the cannon with tremendous velocity. In shape these vortices can be likened somewhat to the rings or puffs of smoke made by a person smoking a cigar. It is claimed that these whirling masses of air, intermixed with gases from the explosives, are forced upward to a sufficient height to enter the hail cloud and destroy its hail-forming processes. If it is granted that these rings ascend to a sufficient height to enter the cloud, I am of the opinion that the force of the ring is too puny to have any appreciable effect on the cloud.

Many experiments have been made for the purpose of ascertaining the actual height to which these air rings rise before being dissipated. In a report by Professors J. M. Pernter and W. Trabert, who, at the invitation of the Imperial Department of Agriculture of Austria and of the inventor of one of the methods, made as complete an investigation as was possible, and, under various conditions, these

scientists state that they were not able to report anything positive as to the value of hail shooting. They reported that, using the largest cannon and the heaviest charges, the vortices did not ascend to a height of 1,000 feet on an average, although in some instances greater distances were obtained.

There is a marked difference of opinion as to the effectiveness of cannon firing, with the manufacturers and many grape growers on the one side and the scientists of America and Europe on the other. The former maintain that hailstorms can be prevented in the manner described, while the latter claim that the force exerted by the explosives is infinitesimal as compared to the forces of nature that are exerted in hail formation, and that experiments conducted by the adherents of the cannonading process themselves have not produced convincing results. The number of thunderstorms from which hail is precipitated is but a small percentage of the actual number. In most localities of the United States a whole season sometimes passes without a fall of hail, while in seasons of abnormal thunderstorm frequency the number of hailstorms is small. While in the grape-growing regions of France and Italy there may be greater hailstorm frequency, it is still true that the number of hailstorms are few as compared to the number of thunderstorms without hail. The experimenters score a success whenever they shoot at a thunderstorm cloud that does not produce hail, although the chances are greatly in favor of there being no hail in the cloud. Again, they excuse the occurrence of hail in spite of a bombardment by saying that the cannon was not large enough or the powder charge sufficiently heavy, and declare that the hailstorm was far less severe than it would otherwise have been. How is one to either prove or disprove such statements?

It is true that many important discoveries have been made by experiments that were conducted contrary to scientific theories, and in the matter under discussion it is not our intention to overweight the scientist or to underestimate the practical investigator, but unquestioned facts and not explanations must be the proof of results. Scientists both in America and in Europe declare that hailstorms cannot be prevented by the use of cannon and explosives of even greater power than have been used or that it is possible for man to use, and they base their belief on such knowledge of the forces of nature as science has revealed. Those opposed attempt to break down the scientists' argument by declaring that no one has yet satis-

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factorily explained the processes of hail formation. This is true to a certain extent, but enough is known upon which to base a logical opinion.

But there are reasons for believing that the use of cannon and explosives in preventing hailstorms is not effective. Mr. Stiger, one of the inventors of the apparatus in use, claims that hail is formed in quiet spots in the atmosphere, where atmospheric moisture crystalizes but in large crystals in a maner analogous to the formation of large crystals of salt in liquid solution. I agree with Professor Abbe that there are no such quiet spots in the atmosphere, and hailstones are not crystals, but masses of ice with only a partial crystalline structure. Even the perfect crystals of the snowflake are formed in the midst of rapidly moving air. Hailstorms are generally local and very erratic. Some have maintained that they are controlled by the hills or the contour of the ground or by the presence of forests and lakes, and this may be true to a certain degree; but practically, the whole question is one of ascending and descending currents that characterize whirlwinds and thunderstorms.

Several thousand shooting stations have been established in Italy and France during the past two years, but reports received from them give no definite data in support of the success of the experiments, although there is no doubt that the cannonading is believed to be effectual by the farmers who do the work. Waves of irrational enthusiasm sometimes sweep over a community, only to be regretted in subsequent years when calmer judgment has come to prevail. We have but to remember the experience of our own country only a few years ago with the rain-makers, and how firm was the belief of thousands of people in the subarid and arid regions of the West that the use of powerful explosives would produce rainfall.

Thousands of dollars were expended in these experiments before the absurdity of the claim was demonstrated. It is a fact worthy of remark that the hail shooters are now using practically the same methods to dissipate the clouds that the rainmakers used to produce them. Time and experiment will probably demonstrate that hail prevention by such means is as impractical as rain production. The fact that 15,000 or 20,000 shooting stations have been established is of itself no argument as to the efficiency of the process. One might as well argue that the moon really affects the weather because a million people believe it and can prove it to their own satisfaction.

A knowledge of the exact truth on any question of natural science is not easily attained. The hail cannonaders base their reports of success upon such statements as "a black cloud was seen approaching, cannon was fired, and the cloud passed over without hail," or "it passed to one side and the hail did not fall on the protected vineyard, and there the hail ceased," or "the cloud broke in two, passing to the right and left, leaving the sky cloudless over the cannon." Now these are quite common cloud and storm phenomena, and they will frequently happen without cannonading. There is no way of telling by the sight of an approaching cloud whether or not it is accompanied by hail. Therefore, if the cannon be used every thunderstorm would have to be bombarded, although statistics have demonstrated that only one thunder cloud out of a great number contains hail. In other words there would be a tremendous waste of time, money and energy in unnecessary bombardments. After examining all that has been published during the past two years on the subject of hail prevention, I have to repeat the opinion heretofore expressed that we have here to deal with a popular delusion, and that efforts should be made to prevent its spread in this country. The great processes going on in the atmosphere are conducted on too large a scale for any man or any nation to attempt to control them. According to Professor Abbe, the energy expended by nature in the production of a hailstorm, a tornado, or a rainstorm probably exceeds the combined energy of all the steam engines and explosives in the world. It is useless for man to attempt to combat nature on this scale.

THE IMPORTANCE OF A CONSIDERATION OF GRADES AND QUALITIES OF GOODS

BY EDW. D. JONES, ASSISTANT PROFESSOR OF COMMERCE AND INDUSTRY. UNIVERSITY OF MICHIGAN, ANN ARBOR.

IT is to be feared that many teachers of commercial geography permit themselves to fall into a loose habit of speaking of the chief staple products of industry as if all portions of the supply of any one of these products were of the same quality and value. It is very easy to speak of cotton or wool or lumber or wheat as

one single and homogeneous product. Even text-books in commercial geography, in speaking of world commerce as regards a single article, often lump together indiscriminately the cotton of the United States, Egypt, Peru and India, or the wool of Australia and Ohio. This view of commerce permits of only the most broad and general consideration of the physical conditions and commercial usages which control industry. As a matter of fact, most of the great staples are, of course, composed of a group of quite distinct classes of products, and each class is subject to a considerable range of very significant variations in quality. It is practically impossible to explain the effect of physical forces upon production, in any close and accurate manner, without recognizing the variability in the quality of individual portions of the world's supply of any staple. And it is equally impossible to describe in detail the operations of any market, or even to prevent the international division of labor, without keeping in view the range of commercially recognized grades.

If we take cotton as an illustration, the commercial geography of the industry of cotton raising suggests at once a broad distinction between "Uplands" and "Sea Island" cotton, and within the first class such local products as "Gulf," "Memphis," "Texas," "Orleans," "Peelers" or "Benders." A recognition of grades clears up the problem why this country, although the greatest cotton supply area of the world, imports considerable Egyptian and some Peruvian cotton.

Almost all the cotton bought and sold in this country is handled on the basis of seven grades designated as fair, middling fair, good middling, middling, low middling, good ordinary and ordinary. Half and quarter grades are also recognized. The half grade is designated by prefixing the word "strict" to the name of the full grade below. The quarter grade below a full grade is designated by the word "barely" coupled with the title of the full grade. The quarter grade above a full grade is designated by using the word "fully" with the title of the full grade. Thus the complete list becomes as follows, the full grades being printed in italics:

Fair.
Barely fair.
Strict middling fair.
Fully middling fair.
Middling fair.
Barely middling fair.

Strict good middling.
Fully good middling.
Good middling.
Barely good middling.
Strict middling.
Fully middling.
Middling.
Barely middling.
Strict low middling.
Fully low middling.
Low middling.
Barely low middling.
Strict good ordinary.
Fully good ordinary.
Good ordinary.
Barely good ordinary.
Strict ordinary.
Fully ordinary.
Ordinary.

The highly discriminating, not to say scientific, character of a market which is based upon such a classification of each sort of cotton (for length of staple and variety of cotton are not considered comparatively) must be obvious and the nicety of judgment required to successfully employ it is deserving of admiration.

As the buying and selling of cotton is regulated at New York by the Cotton Exchange, contracts for cotton are based upon 50,000 pounds of "middling" delivered from a licensed warehouse, at New York, during the month agreed. The price is quoted in cents per pound and varies with the month in which the cotton is to be delivered, according to the prospective relations of supply and demand. In order that other grades besides "middling" can be dealt in, a Committee of Revision occasionally fixes the excess or rebate of price which must be allowed according as a better or poorer grade than "middling" is delivered. A usual price quotation in a New York paper will, therefore, run somewhat as follows:

New York Future Prices—June 5, 1902.

	Open.	High.	Low.	Closing.
June	8.87	8.87	8.87	8.84 @ 8.87
July	8.77	8.77	8.67	8.69 @ 8.70
Aug.	8.47	8.49	8.42	8.43 @ 8.44
Sept.	8.00	8.01	7.96	7.96 @ 7.97

This reflects the day's varying estimate at opening and close and at highest and lowest points regarding the value of "middling"

cotton in New York, and these prices are revised almost daily for each of ten or twelve future months.

To this a statement of rates on and off "middling" is added as follows:

Fair	1.14 on.
Middling fair	0.80 on.
Strict good middling	0.50 on.
Good middling	0.32 on.
Low middling	0.14 off.
Good ordinary	1.00 off.
Good middling tinged	Even
Low middling stained	1.50 off.

Revision November 20, 1901.

The elaboration of grades is no more complete and the consideration of differences of quality no more delicate for cotton than it is for wheat at Minneapolis or for pine as inspected by the Mississippi Valley Lumbermen's Association, or for wool, iron ore, silk, cheese, etc. The recognition of these grades is absolutely essential to accuracy and honesty of dealing and is one of the chief means by which industry is being made more scientific. Ignorance of them on the part of producers of raw materials is responsible for the scarcity of the choicest grades, and is the occasion of much loss to producers through neglect to take precautions, often very simple, and concerning apparently minor matters, which would raise the grade of their products and materially increase their returns.

GEOGRAPHY CURRENT

HYDROGRAPHY

Hydrographic Investigations in the Red River Valley of Minnesota and North Dakota.—The Red River of the North and its Valley occupy a unique position among the streams and valleys of the United States. Collecting the waters from between the two great northern arms of the Mississippi system, this river takes its course almost directly north, uniting with numerous streams draining the lake region of central Canada, and finally reaching Hudson Bay through Lake Winnipeg and the great Nelson River system.

The Red River Valley, besides bringing the Arctic slope for a distance of over two hundred miles within the United States repre-

sents an equally unique position among the agricultural districts of the west. It is safe to say that no equal area within the four northern states, lying on the Great Plains, immediately west of the ninety-seventh meridian, possesses a more productive soil or has such promise of rapid future development. The Red River Valley, from Big Stone Lake with a width of only a few miles, spreads its V-shaped valley northward in a broad level plain reaching a width of no less than seventy or eighty miles at the international boundary. The Red River of the North takes its course down the middle of this very flat valley, one of the most tortuous streams for its length in America. The Valley is not a valley of erosion, but the bed of an ancient glacial lake built up by a lacustrine deposit to a thickness of from thirty to seventy feet. The streams represent the very youngest type of river development. Indeed, on either side of the main stream, large areas lie with such gentle slope that definite drainage channels have been unable to develop; and the heavy clay soil, with the impervious clay beneath, preventing underground drainage, has given rise to extensive areas where the water stands late into the summer months, unless artificially drained.

The Red River of the North has eroded a channel varying from 100 to 300 feet in width, from 20 to 60 feet deep, and which has an average fall of only 6 inches to the mile. The capacity of the river, however, is sufficient to carry off the surplus water from the summer's rains and the spring waters from the melting of an average winter snowfall, but after seasons of unusually heavy snowfall, or when the snow melts suddenly with the aid of rain, the river is incapable of caring for the surplus water, and the resulting flood has been known to extend over the middle of the Valley in places for a width of ten to fifteen miles. When the early settlers came into this region, the undrained surface presented an aspect most forbidding; but by perseverance in draining, through ditches and road making, the aspect has altogether changed.

The Red River of the North has been aptly called the "Nile of America." True, it flows northward; its broad, fertile valley is formed of a lacustrine or alluvial deposit; and it is in a sense still subjected to occasional inundations. The total area within the United States covers between eight and nine million acres or is considerably greater than the productive area of the Nile Valley. But unlike the Nile, the Red River Valley is located in a region having cold winters which renders the land unproductive for one half

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the year. The Red River Valley lies on the border of the subhumid area, receiving an average annual precipitation (about twenty inches) sufficient to produce the large crops for which this Valley is famous, even though the moisture is very uncertain in its distribution. However, depending upon cyclonic storms for its rainfall, which varies from fifteen to thirty inches, it is seldom that conditions favor a maximum crop yield of which this rich soil is capable.

As the country develops and intensive and diversified agriculture results, the question is not alone that of drainage and getting rid of surplus water in wet seasons, but also that of equal importance how to conserve and utilize this water during dry seasons, or dry periods of each season. The Nile Valley, with a productive area of only three-fourths the size of that of the Red River Valley within the United States, and with crude methods of irrigation and agriculture, was able in 1890 to support a population of over 6,000,000 people, while the population of the Red River Valley is less than one-thirtieth of that number. The Red River Valley, for climatic reasons, can never hope to equal in productiveness that of the Nile, yet with intensive agriculture, which is rapidly developing, who will dare predict what the future shall be, when its natural resources are fully developed? The one question in either of the areas above compared has been that of the natural development and control of the water resources. The demand has been growing for a number of years that some effort be made to determine whether a better control of the surface waters of the Red River Valley could not be accomplished. In response to these demands, and recognizing their importance, the United States Government has, through the hydrographic division of the U. S. Geological Survey, taken up the work in the Red River Valley with the view of determining the annual discharge and capacity of the principal streams, the location of possible reservoir sites where water may be stored not only to relieve the spring floods, but to be used later for power or irrigation. Gauge stations are being maintained along the Red River and on its principal tributaries, and the results of these investigations will be published each year as a part of the annual report of the U. S. Geological Survey.

PHYTOGEOGRAPHY

The Forests of Russia.—The gradual deforestation of Russia is attracting increased attention throughout the Empire, and the Forestry Society, as well as the forestry department of the Ministry of

Agriculture and Domains, are discussing means for regulating the consumption of timber and for propagation. "Wooden Russia," as it is familiarly called, does not appear to be in any immediate danger, as a recent official report states that forests in this country now cover a gross area of 188,000,000 hectares (464,548,000 acres). Among European countries Sweden comes next, with 18,000,000 hectares (44,478,000 acres) of forest. In Russia, the forests cover 36 per cent. of the whole imperial area; the Swedish forests occupy 44 per cent. of the total area; and the Austro-Hungarian 32 per cent. of the territory of the Dual Monarchy.

The forests have a greater importance for Russians than for people of West European countries, as villages and country houses are largely built of wood, stone and brick houses being almost unknown, and the forests furnish the main sources of fuel supply. While the imperial committee complains that it is private owners who are recklessly devastating the forests and urges that adequate laws and regulations be enacted to prevent this, the Forestry Society calls attention to the fact that, according to the official report of the forestry department of the Ministry of Agriculture and Domains, the Crown forests furnished a revenue of 17,600,000 rubles ($9,064,000) in 1890, and 48,000,000 rubles ($24,720,000) in 1899. It is claimed that this advance in nine years could not be due to the natural increase of timber growth, and it is urged that the Government set an example in moderation.—*Consular Reports,* March, 1902.

Plant Distribution in the Caucasus Lands.—Dr. Gustav Radde has published an extensive treatise on the Caucasus vegetation. This work forms the third volume of a series edited by Engler and Drude, and entitled "Vegetation der Erde." Previous volumes have dealt with the Iberian Peninsula and the Carpathian region. The scope of this important series is exceedingly comprehensive; indeed the volumes may be regarded as complete monographs, so far as present knowledge makes completeness possible. North of the Caucasus the characteristic Russian steppes with their famous black earth reach a high development; farther east salty steppes replace the black earth steppes, having but recently come from the sea. In Colchis there are luxuriant evergreen forests, somewhat like those of the Mediterranean region. However, there are some interesting plants in this region unlike those now living in southern Europe but like preglacial species of central Europe; thus Colchis was probably a

place of refuge during the ice age. The snow line is much lower on the western than on the eastern Caucasus, because of greater precipitation toward the Black Sea, but the line has an equal altitude on the north and south slopes. Some Alpine plants flourish a thousand feet above the level of perpetual snow. H. C. C.

Postelsia,* the year-book of the Minnesota sea-side station for biology, contains some articles of interest to students of geography. "Uses of Marine Algae in Japan" and "Distribution of Marine Algae in Japan," by K. Yendo, are of especial interest. The first catalogues those marine algae of the region which have an economic interest, and describes the various ways in which they are used. The second discusses the conditions making possible the different groupings of marine algae and classifies the forms found. Because of the way in which the ocean currents run, there are decided temperature variations in the water of the region. These conditions of temperature are associated with distinct differences in the algae flora, although there are gradations between them. On the Pacific coast side beginning at the Kurile Islands, there is a subarctic flora which gives way to a mixture of cold and warm region forms at Kiushiu Islands, and finally is entirely displaced by tropical forms in the vicinity of Formosa. The Japan seaside part of the coast has a subtropical representation of algae, while that part receiving the arctic stream has a distinctly arctic flora.

Other topics of geographic interest in the book are "Remarks on the Geographic Distribution of Plants, East of the Divide," by Francis Ramaley, and "The Kelps of Juan De Fuca," by Conway MacMillan. O. W. C.

ZOOGEOGRAPHY

Hatching 100,000,000 Shad Eggs.—Shad fishing is an important local industry on the Delaware River. The shad, like the salmon, is a fish which spends the most of its life in the sea, but runs up to the shallow tributaries of rivers to spawn. The young fish later in the season go out to sea, whither no man knoweth, until at maturity, three or four years later, they come back to the place of their birth, the breeding grounds of their race, and in turn lay their eggs.

Much seining along the Delaware has reduced the supply, so now the United States Fish Commission each spring despatches a

* *Postelsia*, published by Conway MacMillan. University of Minnesota, Minneapolis, Minn. Price, $3.25. First edition limited to two hundred and fifty copies.

steamer, equipped as a fish hatchery, to strip all the fish taken in the nets during the spawning season, hatch the eggs and transplant the young fish in the shallow headwaters of the Delaware. The work as in progress this year on the Steamer *Fish Hawk* is described by the *New York Herald* of April 10:

"The gathering of shad spawn and the artificial hatching of the eggs are very interesting and instructive, great care being necessary not only in the work of hatching, but in the selection of the fish and the gathering of the spawn, as well as the handling of the young shad after they are ready for shipment to the various points for 'planting,' or depositing in the open waters of the river.

"Every afternoon several boats, manned by two thoroughly experienced men each, leave the *Fish Hawk* for the various shore fisheries and the headquarters of the gill net fishermen to obtain the spawn for hatching. As the shad are removed from the nets they are examined very carefully by the spawn taker to ascertain whether they are 'ripe'—that is, whether the spawn is in proper condition to be taken for artificial hatching.

"When the female is thus found in proper condition the eggs are stripped into a pan or other vessel, and the fish is returned to the fisherman to be sold as a 'buck' or 'barren.' The milt of the male shad is then taken and spread over the spawn, and very often, if the eggs are not thoroughly fertilized, the tail of a shad is used to stir the contents of the vessel, in order to insure the best possible results, without breaking the eggs or destroying them for hatching purposes.

"When sufficient spawn has been collected for the capacity of the hatching jars on the steamer the boats of the spawn takers are gathered up by the vessel's naptha launch, and the spawn is immediately transferred to the *Fish Hawk,* where it is placed in large jars on tables on the main deck, each jar holding from 75,000 to 90,000 eggs.

"Before the eggs are placed in the hatching jars they are subjected to a careful washing, and, this process over, the water is turned into the jars and the process of hatching is begun. The water is kept at a certain temperature, and causes the eggs to be always in motion, thus preventing them from adhering to each other. Dead eggs rise to the surface and are drawn off by a siphon.

"In two or three days the eyes of the little shad appear and are distinctly visible as two black spots, then the back bone shows itself, and in a few days more the little creatures break from their prison and struggle to the top of the mass of eggs. Then they are caught

by the siphon and carried into one of the aquaria, where they find hundreds of their kind.

"When these hundreds become thousands they are dipped out and placed in very large storage aquaria. At this period each little fish has attached to it what is called an umbilical sac, and on the contents of this it feeds for several days.

"The Fish Commission has no means of feeding the little ones, and, therefore, a few days after being hatched, they are placed in large milk cans and carried to the headwaters of the Delaware and deposited in the water to shift for themselves. This, except those that are followed too closely by the rockfish, they do readily enough, feeding on the abundant animalculæ of the river until they are able to start for the sea, where they remain until they reach maturity, three years after being hatched.

"The average female shad, when ready to rear a family, can produce about 30,000 eggs, the actual number depending on her age. If she succeeds for several years in surmounting the perils of the journey from the sea to the spawning grounds, and of egg laying and hatching, she may reach a maximum of between 60,000 and 70,000 eggs.

"Of the ova deposited naturally in the river not more than ten per cent. are hatched. A large number are not fertilized, and a larger number are devoured during incubation by eels, German carp and other fish.

"This is only the beginning of their troubles. When the parent fish swim to the headwaters of the river the rockfish, or, more properly speaking, striped bass, which appreciate the flavor of shad quite as much as man, go along and when the spawning ground is reached hang around impatiently for the young to hatch, feeding meanwhile on minnows or anything in the fish line that comes along, rounding up and demolishing whole schools.

"As soon as the young shad are hatched the rockfish waxes fat. He loiters with them all summer and follows them on their downward journey to the sea in October and September. It is estimated that of three hundred shad hatched in the spring not more than twenty-five or thirty on an average succeed in reaching salt water.

"It is here that man steps in and shows himself to be a better economist than Dame Nature, who has, in fact, shown herself to be wasteful to prodigality in some of her methods of work. He takes the 30,000 eggs, causes them to be thoroughly fertilized and, by

means of certain contrivances, hatches out about twenty-seven thousand, against Nature's three hundred by her primitive methods. Therefore, instead of only about twenty-five or thirty young shad reaching the sea between 2,500 and 3,000 accomplish the trip safely."

ANTHROPOGEOGRAPHY

Sociological Tendency in Irrigation.—The statement which has been made that 10,000 people are supported on 13,000 acres of irrigated lands at Riverside, California, in greater comfort if not luxury than in any other agricultural district of the United States, is suggestive of a tendency of development peculiar to irrigation. This tendency is well illustrated by a comparison of the population of the Riverside district with that of the wheat lands, unirrigated, of the northern part of the same state where the population is not over 1/100 part of the above ratio. From its very limitations, farming under irrigation must be intensive to be successful. Water can only be applied on small areas so that the land it reaches must be made to yield more in proportion than is common in dry farming. Fortunately this is the case. The greater control irrigation gives over moisture, the warmth and abundant sunshine and the rich fertile soil of the arid regions, all combine to accomplish this end. Owing to the restricted area of each man's holdings only the higher priced products can be profitably raised, so that not the grains which require large farms, but certain needed vegetables and especially the high priced citrus fruits are found to yield satisfactory returns. Hence, with smaller and more productive farms it is possible for the irrigator to enjoy the benefits of community life with its social opportunities and material advantages. Riverside has many of the improvements of a city, a water system, electric traction, light and power, which with its comparative compactness makes possible a social life for its inhabitants entirely foreign to the ranch and large farm sections of other parts of the country. G. B. H.

The Mountains.—The ministry of the mountains was the theme of a recent sermon of Dr. Gladden, the well-known preacher of Columbus, Ohio. The principal uses of mountains which Mr. Ruskin emphasizes are the giving of motion to the water by which the earth is refreshed, the promotion of constant changes in the currents of the air, and the replenishing of the soil of the valleys by the detritus borne by the waters from their sides to the lowlands. Even the

volcanoes play an important part, for as the waters wear away the materials of the land depositing them upon the sea floor, the internal heat expels the most volatile and life-giving of these substances to again take their place within the activities of the surface of the earth.

The ministry of the mountains is that by which they appeal to our imagination and our higher emotions. It would seem that the sublime language in which they address us must tend to the ennoblement of all who hear it. But it must be admitted that the facts do not confirm this expectation. The mountain peasants of Switzerland do not possess the intellectual and spiritual elevation which one would look for. But this is due, no doubt, to economic causes. They are brutalized by their struggle for life.

But to those who have eyes to see and ears to hear, the mountains are full of inspiration. They have always been sacred shrines. The Greeks placed heaven upon Olympus and gave Apollo a throne upon Parnassus; it was on Sinai that the law was given to Moses, amid thunderings and lightnings and voices; it was on Nebo that the great lawgiver caught his glimpse of Canaan and found his grave; it was on the mountain by the Sea of Galilee that the Gospel of the Kingdom was first preached; it was on some hight apart, perhaps on the slope of snowy Hermon, that the Lord of life was transfigured; it was on the hill called Calvary that He was lifted up, and from the Mount of Olives that He passed from earthly sight. There is some good reason why mountains should have been the scenes of these august events in the history of the world. They are fitted to be the thrones of the divine manifestations. They are high and strong and steadfast. It is by a divine impulse that we lift up our eyes to the hills from whence our help cometh. They are the dwelling place of Him whose strength is our shelter, whose power gives us peace. E. D. J.

ECONOMIC GEOGRAPHY

Siberian Commerce.—The interest which the American transcontinental railways are taking in Asiatic trade is shared by the Canadian Pacific Railway. This energetic company in 1901 sent Mr. W. Whyte, assistant to the president of the railway, to report on the opportunities for the development of trade with Siberia. In the fall of 1901 this official presented two reports; one of these was a special report for the information of the company; the other,

which is of more general interest, has been given to the public. From it some interesting details with reference to the Siberian railway and the commerce of the section it traverses may be obtained. Mr. Whyte's comments with reference to the railway are of interest in that he speaks as a railway man.

The Siberian railway is divided into six sections: First, the Western from Cheliabinsk to Ob River, 880 miles; second, the Central, from the Ob River to the city of Irkutsk, 1,162 miles; third, the circum-Baikalian, which will go around the southern end of Lake Baikal to Missovia on its eastern shore, 194 miles; fourth, the trans-Baikalian, from Missovia to Stretinsk, 609 miles; fifth, the Amur, from Stretinsk to Chabaroffsk, 1,326 miles; sixth, the Ussurian, thence to its terminus Vladivostok, 483 miles.

The construction of the fifth section was temporarily given up, on account of the disturbed conditions in the East. This section has given way to the Chinese Eastern railway, 950 miles in length, which is being built by a private company under arrangement with the Russian government, from Kaidovolo, west of Stretinsk, towards Peking.

In the latter part of 1901 the portion of the Siberian railway given over to the Operating Department was roughly 3,200 miles in length. The number of men employed in construction work upon the road has at no time been less than 70,000; 9,000,000 ties have been used; and for the timber required in the construction of the work 100,000 acres of forest have been used.

In the section between Cheliabinsk and Irkutsk careful attention is being devoted to agriculture. The former town is the most important grain center in Siberia. The methods of farming are, however, yet in the primitive stage: in many places the settler still uses the old-fashioned scythe or the sickle; and this although the government is endeavoring to popularize the use of improved agricultural machinery. The wheat in the country about 1,000 miles east of Cheliabinsk sells for from 50 to 52 cents per bushel. In time grain shipments from this section will be exported from Vladivostok and the mouth of the Amur River. At present the bulk of the grain goes to western Russia; some small portion of it finds its way to the Siberian gold mines. There is a developing dairy trade from this section; butter is shipped to western Russia and thence to Denmark and to England.

The fuel question, so important in a northern climate, does

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not present any difficulty. Although the country is well forested between Cheliabinsk and Irkutsk coal is used in locomotives. Both bituminous and lignite coal are found in abundance. The Government is making an energetic attempt to settle this section. During the spring of 1901 settlers from western Russia arrived at some points in this territory at the rate of one hundred a day. The Government allots a free grant of forty acres to each male inhabitant. The grants so obtained from the Imperial free lands may neither be sold nor mortgaged. The Government sells supplies and implements to the settlers on easy terms.

The section east from Irkutsk has not so far attracted much settlement. In the territory traversed by the trans-Baikal section of the railway there are about 170,000,000 acres of which barely one one-hundredth part is under cultivation. The country is mountainous and is afflicted by frequent droughts. According to the latest returns this section is said to contain 1,300,000 head of cattle, 1,200,000 sheep, and 600,000 horses. These herds, which are owned by the nomadic tribes, increase but slowly on account of the prevalence of the cattle plague.

In the Vladivostok district there has been some export of grain; there are also coal mines.

The articles of foreign manufacture for which there is a demand at present are pumps, agricultural implements, portable engines, saddlery, hardware, rubber goods, and canned goods. Local Government stores are maintained from which the peasants purchase agricultural machinery. The machines are of Russian, English, American, Canadian, and German manufacture. Russian reapers are sold at $75; but light American reapers are readily disposed of at from $105 to $110. So far there is only a slight demand for self-binders. It is stated that the reason for this is that the mechanism is too intricate for the ordinary Siberian peasant to repair when there is any derangement. S. J. McL.

The World's Wheat Crop.—The World's wheat crop of 1902 is among the largest ever harvested. In the northern hemisphere the production is this year 2,279,200,000 bushels, of which the United States contributed 680,000,000 bushels, Canada 88,000,000 bushels, and the chief countries of Europe 1,511,200,000 bushels. The producing countries of Europe in their order with the crop of 1902 are as follows:

Russia	416,000,000	bushels.
France	336,000,000	"
Austria-Hungary	208,000,000	"
Germany	136,000,000	"
Italy	116,000,000	"
Spain	112,000,000	"
Rumania	84,000,000	"
United Kingdom	52,000,000	"
Bulgaria	28,800,000	"
Belgium	12,800,000	"
Portugal	9,600,000	"

—*Bulletin of Bureau of American Republics* from *Liverpool Corn Trade News.* E. D. J.

The World's Live Stock.—In the world there are approximately 200,000,000 cattle, 450,000,000 sheep and 125,000,000 swine, of which 25 per cent. of cattle, 45 per cent. of sheep and 95 per cent. of swine are annually available for food, so if a beef were worth $50, a hog $8 and a sheep $3, the grand total of animal consumption would come to $4,260,000,000.

Of the world's total of live stock the United States has 69,438,000 cattle, 61,837,000 sheep and 64,694,000 swine, showing that we furnish 34.72 per cent. of the world's cattle, 13.74 per cent. of the world's sheep and 51.75 per cent. of the world's swine. Texas has more cattle within its borders than any other state, 9,426,000 head.

The largest single ranch in the world, composed of 3,000,000 acres, is owned by a Texas syndicate, and the three largest ranches owned by individuals are the property of Texas women. Mrs. Adair at Paloduro has 2,000,000 acres, on which she ranges 100,000 head of cattle, and in both size of ranch and number of cattle she is closely rivaled by Mrs. King, of Corpus Christi, and Mrs. Whitman, of the Pan Handle. The largest rancher among the men engaged in that industry is Col. C. C. Slaughter, of the "Lazy S" brand.—*Hide and Leather* from *Kansas City Journal.* E. D. J.

A Half-Century of the World's Iron and Steel Trades.—The *Iron Age* has compiled some interesting figures showing the relative position of this country in the evolution of the world's iron and steel industry.

IRON.

In 1850 the world's production of pig iron was 4,401,415 gross tons. Great Britain produced a trifle over one half, the United

States produced 563,755 tons, the third country was France, fourth Germany, fifth Austria-Hungary. Since then the production of pig iron has increased by leaps and bounds.

1850	4,401,415	gross tons.
1860	7,400,000	" "
1870	11,900,000	" "
1880	17,950,000	" "
1890	27,157,000	" "
1900	40,087,616	" "

The production of 1900 was divided between the first five nations as follows:

1. United States	13,789,242	gross tons.
2. Great Britain	8,959,691	" "
3. Germany and Luxembourg	8,381,373	" "
4. Russia	2,859,815	" "
5. France	2,669,966	" "

STEEL.

In 1850 the world used but 85,000 tons of steel. Of this Great Britain produced 40,000 tons, France 15,000, Austria 14,000, Germany 10,000; Russia and the United States were tied for fifth place with a production of 2,000 tons each.

The proof that we have become the age of steel lies in the figures showing the growth of steel production since the above period.

1850	85,000	gross tons.
1860	200,000	" "
1870	700,000	" "
1880	4,274,000	" "
1890	12,231,000	" "
1900	27,130,815	" "

The five leading producers in 1900 ranked as follows:

1. United States	10,188,329	gross tons.
2. Germany and Luxembourg	6,257,745	" "
3. Great Britain	5,050,000	" "
4. Russia	1,800,366	" "
5. France	1,569,481	" "

—*Bradstreet's*, October 11. E. D. J.

Current Articles on Commerce and Industry.—Banana Trust, *Commercial Bulletin and N. W. Trade*, November 1.

Canada, *Bradstreet's*, November 1.

Cauliflower Industry of Long Island, *American Agriculturist,* November 8.

Cement, The Age of, *The Manufacturer,* November 1.

Coal Trade of the United States and the World's Coal Supply and Trade. *Monthly Summary of Commerce and Finance,* September.

Costa Rica, Gold Mines of (Illustrated), *Bulletin of International Bureau of American Republics,* October.

Farm Calendar for November (Illustrated), *Country Life in America,* November.

Forestry, Does Farm, Pay (Illustrated), *Country Life in America,* November.

Hail, Congress for Protection Against, *Consular Report,* November.

Hemlock Bark Industry, *Hide and Leather,* November 1.

Hog Industry of Northwestern Nebraska (Illustrated), *Corn Belt,* November.

Irrigation Country, Successful Colony in (Illustrated), *Review of Reviews,* November.

Japan, Commerce of, in 1901, *Consular Reports,* November.

Natal, Railway System of (Illustrated), *Engineering Magazine,* November.

New York, The Business Center (Illustrated), *Harper's Weekly,* November 15.

Oils, Marine Animal, *Paint, Oil and Drug Review,* October 29.

Peat, Utilization of in Europe (Illustrated), *Engineering Magazine,* November.

Spitzbergen, Coal Mining in, *Stoves and Hardware Reporter,* November 6.

Sugar, Columbus the First Planter of, *American Agriculturist,* November 8.

Technical Education, Industrial Importance of, *Engineering Magazine,* November.

Turkeys and Cranberries (Illustrated), *Country Life in America,* November.

Brick making, Ancient and Modern, *The Clay Worker,* November.

Canada, The Michipicoten Region (Illustrated), *The World To-Day,* December.

Coal, Labor and Life in Anthracite Mining, *Engineering and Mining Journal,* November 22 and 29.

Corn Crop, Story of (Illustrated), *The World To-Day,* December.

Diamond Production of Bahia, *Bulletin of International Bureau of American Republics,* November.

Dairying in the South, *The Southern Field,* November.

Asia—The Far East of To-Day (Illustrated), *The World To-Day,* December.

Fisheries, Problem of the Atlantic, *Atlantic Monthly,* December.

Guatemala, Industrial and Economic Conditions, *Bulletin of International Bureau of American Republics,* November.

Hemp Industry, American (Illustrated), *Scientific American,* November, 29.

Japan, The Schoolmaster of Asia, *Review of Reviews,* December.

Manufactures in the South, *The Southern Field,* November.

Mormons, A Successful Coöperative Society (Illustrated), *World's Work,* December.

Nile, Subduing the (Illustrated), *World's Work,* December.

Peach, Cultivation of, *American Agriculturist,* November 15.

Petroleum: Beaumont, Past, Present and Future, *Paint, Oil and Drug Review,* December 3.

Post Office, The Traveling (Illustrated), *World's Work,* December.

Salmon, The Blueback (Illustrated), *The World To-Day,* December.

Ship "Combine" (Illustrated), *Review of Reviews,* December.

Soo, Giant Growth of (Illustrated), *Review of Reviews,* December.

Standard Oil Co., Rise of (Illustrated), *McClure's Magazine,* December.

Timber, Destruction of on Western Forest Reserves (Illustrated), *Harper's Weekly,* November 29.

Transcaspian Railway (Illustrated), *The World To-Day,* December.

Venezuela, Agricultural and Industrial Situation, *Bulletin of International Bureau of American Republics,* November.

E. D. J.

POLITICAL GEOGRAPHY

Emigration from Siberia.—In the January number of the *National Geographic Magazine* (Volume XIII), is a note on "Emigration from Siberia," which is significant, as it bears on the characteristics of a people. The note states that out of 77,774 immigrants who entered Siberia in 1901 (during the first nine months), 19,728 persons (25 per cent.) returned within a short period. The reason for this backsliding in the eastward movement of Russian peoples is credited to two causes—first, the failure of the crops in the past two

years; second, that 16,000 of the immigrants had come from the grain provinces of Russia and found only forest lands along the railroad open for settlement, the available farmlands being already preëmpted. The real underlying cause, however, is to be found in a racial characteristic and in governmental policy. There was little if any turning back in the westward movement of the American people who found both forest and steppe land as they advanced across the continent. It is all the difference between a *dependent* people and an *independent* people. It is the difference between the settling of a new land by a government-ridden people, and a people whose very tradition and instinct is that of individual courage and independence. It has been elsewhere stated that the Russian authorities desired neighboring families to immigrate together into the new land, so as to feel more contented. This savors of the courage of the pack, which is always marked by the cowardice of the individual. The American pioneer did not need the companionship of old neighbors to keep up his courage, and make him feel at home. Another significant comparison might be drawn in the opening up of these new lands: that while in America the railroad followed the people, in Siberia the people followed the railroad.

S. T.

GEOGRAPHY TEACHING

Outlines for Teaching the Geography of Michigan.— (As arranged for schools of Albion, Mich.) (The following topical outline indicates very clearly the kind of details that are legitimate in a study of local geography, but many of which would be out of place in the study of the same state by non-resident pupils. The topics might to a certain extent be changed in their order; but the order as given suggests the causal relations that can be brought out in the work. It is interesting to note the amount of history, some of it not geographically determined, that seems to the author a proper part of geography. Editor.)

PUBLIC SCHOOLS OF ALBION, MICHIGAN.

OUTLINES FOR TEACHING MICHIGAN GEOGRAPHY.

I. Boundary and extent.
   1. General boundary (water and land).
   2. Definite (see state constitution, Art. I.).
   3. Coast line (extent, projections, indentations).
   4. Adjacent waters (rivers, lakes, canals).

5. Islands (location, ownership).
6. Area (square miles).
7. Measurement (miles).

II. Surface.
1. Watersheds and slopes.
2. Rivers and drainage (describe principal rivers).
3. Hill and mountain ranges (highest land).

III. Climate.
1. Comparative (states in same latitude).
2. Mean or average temperature.
3. Effect of Great Lakes on temperature.
4. Prevailing winds and effects.
5. Rainfall (amount—how determined).
6. Difference in upper and lower peninsulas.

IV. Railroads.
1. Termini, direction, leading towns, abbreviations.
   a. Michigan Central.
   b. Lake Shore and Michigan Southern.
   c. Chicago and Grand Trunk.
   d. Grand Rapids and Indiana.
   e. Toledo and Ann Arbor.
   f. Flint and Pere Marquette.
   g. Detroit, Grand Haven, and Milwaukee.
2. Transfer of cars, Detroit, Pt. Huron, and other points.

V. Resources.
1. Agricultural.
   a. Location of agricultural regions.
   b. Rank of Michigan as an agricultural state.
   c. Rank in production of single products.
   d. Fruit and fruit regions.
   e. Sugar and the sugar beet.
   f. Chicory and its manufacture.
3. Forests.
   a. Rank of Michigan in production of lumber.
   b. Location of pine belt, hardwood belt.
   c. Lumbering—camps, cutting, hauling, mills.
   d. Future of the industry and of lumber towns.
   e. Uses of pine, of hardwood.

3. Mines.
   a. Rank of Michigan in production of different minerals.
   b. Location of mineral regions.
   c. Principal towns and cities in mining regions.
   d. Mining machinery and equipment.
   e. Shipping points—docks—vessels.
   f. Coal—kind—where obtained.
   g. Smelting works—location.
   h. Grindstone—building stone.
4. Salt.
   a. Rank of Michigan in production.
   b. Location of salt regions—leading towns.
   c. Processes of manufacture—cost per barrel—why so cheap.
5. Fisheries.
   a. Rank of the state.
   b. Kinds of fish—inland—lake.
   c. How caught—how marketed.
6. Manufactures.
   a. Rank and comparative quantity and value of goods.
   b. Leading manufacturing cities.
   c. Furniture, stoves, cars, pianos, organs, matches, soap, wagons, carriages, silk, threshing machines, farm implements, pins.

VI. Cities.
1. Name six largest in order of size.
2. Locate and tell why important—Detroit, Grand Rapids, Saginaw, Lansing, Jackson, Bay City, Kalamazoo, Ann Arbor, Marquette, Battle Creek, Muskegon, Calumet, Sault Ste. Marie.

VII. Commerce.
1. Waters passed through from Duluth and Chicago to Buffalo.
2. Canals and artificial waterways.
3. Lighthouses, breakwaters, locks, harbors.
4. Location of leading lake ports.
5. Principal products shipped each way.
6. Large freight boats—passenger boats—"Northwest."
7. Amount and value of lake commerce.

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VIII. Animals.
1. Lists of native animals, living and extinct.
2. Fish and game laws—necessity.
3. List of useful wild animals.

IX. Historical.
1. First settlement—when? where? by whom?
2. Names of a few early explorers.
3. Early settlers. Where from? Scenes from their lives.
4. First steamboat—first railroad—first newspaper.
5. Origin of the following and other names: Michigan, Calhoun, Albion, Jackson, Shiawassee, Clinton, Marquette, Ingham, Cass, Charlevoix, Hilisdale, Detroit, Grand Rapids, Ypsilanti, Bay City, Lansing.

X. Biographical.
1. Marquette, LaSalle, Cadillac, Pontiac.
2. Houghton, Woodward, Pierce, Schoolcraft.
3. Cass, Mason, Clair, Chandler.
4. Alger, Luce, Dickinson, Palmer.
5. Carleton, Edison, Rose Hartwick Thorpe.

XI. Institutions.
1. Educational.
2. Charitable.
3. Reformatory.
4. Penal.

XII. Government.
1. Seat of Government—location.
2. Constitution—Nature of—date of adoption.
3. Departments—functions of each.
4. State officers—general duties.
5. County officers—general duties.
6. County seat, court house, jail.
7. City officers—Council—Fire Department.
8. School officers.

XIII. Recreations.
1. Mackinac Island—Park—scenery.
2. Mormons in Michigan—King Strang.
3. Toledo War—upper peninsula—state boundary.
4. Pontiac's conspiracy—Major Gladwyn.
5. Ordinances of 1787—provisions.

6. Hull's surrender of Detroit.
7. Perry's victory—his despatch.
8. Wild Cat Banks.
9. The War Governor—his statue.
10. Capitals—location—present building—cost.
11. Primary school money—source—distribution.
12. Erie Canal—DeWitt Clinton.

W. J. McKONE.
SUPERINTENDENT OF SCHOOLS,
ALBION, MICH.

Congo or Kongo? The Former Spelling of the River's Name Favored by Usage.—It appears to be due to the United States Board on Geographic Names that the English-speaking peoples do not have a uniform spelling of the name of the second greatest river in the world. The spelling Kongo, however, is confined almost wholly in this country to Government publications and maps, which are required to abide by the decisions of the board.

It is difficult to say upon what logical or historical grounds the board adopted Kongo. The word was spelled Congo by the Portuguese explorer Diego Cam, who discovered the mouth of the river in 1484–'85.

This is the spelling in all the Latin countries that give the name to the river, though the Portuguese call it the Zaire. Congo has been the common usage among all English-speaking peoples for three centuries without variation, with the recent exception of our Government publications.

For some inscrutable reason the Board on Geographic Names decided to employ the spelling Kongo, used largely by German writers, but not by some of the leading German geographers. The form Congo for example, is used in the Stieler and Taschen atlases, published by the famous map house of Gotha, and also in Dr. Egli's "Nomina Geographica," the most authoritative work on geographic names.

The name given by common consent to this river is an interesting illustration of the many mistakes in geographic nomenclature. The river was never known to African natives as the Congo.

They in fact, apply different names to different parts of the river. Diego Cam made the blunder of attaching to the river the name of the ancient native State to the south of it.

When later Portuguese travellers asked the people of the lower Congo what they called the river they said it was the Zaire. The

poet Camoens sang of "that crystal clear river, the long winding Zaire," and the Portuguese have retained the name to this day.

But the word was not a name; it means simply river and was applied by the natives near the Congo to any large stream. The Congo as a whole never had a native name.

But the word Congo, though wrongly applied to the river, had been so thoroughly established in the literature and maps of several centuries that the world declined to give it up when Stanley attempted to substitute the name Livingstone River. Congo it is and will always remain; and Congo is the spelling, warranted by centuries of usage and adopted by most writers and map makers. —*N. Y. Sun.*

GEOGRAPHIC LITERATURE

BOOK REVIEWS

The Physical Geography of New York State.—Ralph S. Tarr. 8¾ x 6 inches. New York and London, The Macmillan Company, 1902. Pp. xiii + 397. Price, $3.50 net.

Professor Tarr's large and inclusive volume on the Physical Geography of New York State is made up of a series of articles that first appeared in the Bulletin of the American Geographical Society, and which have now been brought together in a revised form, to make the first and the only book on a subject that has been too long neglected.

The volume consists of twelve chapters with the following titles: General Physiographic Features, The Mountains of the State, The Influence of the Glacial Period upon Topography, The Rivers of New York, Lakes and Swamps, Origin of the Basins of the Great Lakes, Post Glacial History of the Great Lakes, Niagara, The Shore Lines, The Climate of New York (E. T. Turner), Influence of Physiographic Features upon the Industrial Development of the State.

The book is extensively illustrated by a large number of diagrams, maps and plates, many of which are so poorly reproduced that they are worthless as illustrations and seriously mar the beauty of a book that is otherwise very pleasing typographically.

The book is not very logically arranged, and the consulting student will find certain chapters far superior to others, the most useful chapters probably being those devoted to the Great Lakes.

The one particularly striking feature of excellence is the bibliography which is very inclusive, very accurate, and much needed. Professor Tarr's ability to construct a bibliography is well known and here we have a striking illustration of his success in this line, though a more serviceable arrangement for the consulting student could very well have been employed.

The volume as a whole is disappointing and is probably too high priced to be used extensively by the teachers of New York State. This is to be regretted, for New York is such a "pivotal" state physiographically, as well as economically that its geography ought to be better taught in all schools. A usable, accurate, clear and well-illustrated manual for the state, sold at reasonable price, would be a geographical and educational success. R. E. D.

Descriptive Geography from Original Sources: (1) Central and South America with the West Indies, pp. xxxiii + 239; (2) Africa, pp. xl + 264.—F. D. and A. J. Herbertson. 7 x 4½ inches. London, Adam and Charles Black; The Macmillan Company, American Agents, 1902. Price, 2 s. per volume.

In the number of this JOURNAL for February, 1902, attention was called to the series of Descriptive Geographies by Dr. and Mrs. Herbertson, of which the volume on North America was the first to appear.

It is a pleasure to announce the appearance recently of the two companion volumes, the full titles for which are given above. These several anthologies are admirably adapted for use in upper grammar grades where it is desired to give pupils training in working out special topics. In many schools such work is out of the question owing to lack of library facilities, or because the sources available for reference are too ponderous for use by elementary pupils.

In these anthologies we have given us, in selected abstracts from the leading authorities, the essential features of the countries described. Each book opens with an admirable summary of the geography of the region as a whole, and closes with a well-selected and well-arranged bibliography. Thus the books are well arranged for use and so planned that they can fit into almost any course in geography.

The user of the book gains confidence that he is in touch with the best and the truest materials, selected and arranged by geographers who know thoroughly the facts with which they are working. The books, therefore, have a permanency and accuracy of value rarely to be found in the more familiar geographical readers, most of which have been written by authors who are not specialists in any of the higher phases of geography.

The books would have been much more serviceable if they had been provided with a few good maps, and it is hard to see why such necessary helps have been omitted. The atlas habit is not well developed among school children or adults, and maps accompanying the text would be of great service in giving training in using an atlas. This lack seems to be the only serious one, but in the mind of the reviewer it is the one lack that keeps the books from attaining undoubted superiority. R. E. D.

A Short History of English Commerce and Industry.—L. L. Price. New York, Longmans, Green & Co. 12mo. Pp. xii + 252.

It is encouraging to notice the gradual drift of thought in England as in this country, to the notion that the two great formative "agencies of the world's history have been the religious and economic." That "here and there the ardour of the military or the artistic spirit has been for a while predominant; but religious and economic influences have nowhere been displaced from the front rank, even for a time, and they have nearly always been more impor-

tant than all the others put together." It is with this conviction that Mr. L. L. Price makes a brief account of the commercial and industrial development of England from its earliest times to the establishment of free trade in the middle of last century.

The author lays no claim to originality, is under constant obligation to Ashley and to Cunningham, and gives a readable and welcome contribution in the line of an economic interpretation of historic events. J. P. G.

NOTES

Chicago Geographic Society.—The first meeting of the year 1902–3 was a luncheon at the Palmer House, with brief speeches on "Vacation Observations." The plan of exercises for the year it to have a series of addresses by the consuls of various countries, each on the land he represents. In the December meeting, Miss Zonia Baber, as retiring president, gave an address on the West Indies. The question of a permanent home for the society is under discussion.

LOUELLA CHAPIN,
Secretary.

Errata: Through an oversight for which the editor is alone responsible, the proofs of Professor Jefferson's two articles printed in the November issue, were not submitted to the author, and several errors crept in. The following corrections should be made: p. 402, l. 2, for Elmswood read Elmwood; p. 402, l. 3, for require read required; p. 402, l. 4, for appear read appears; p. 403, l. 4, for superadjacent read overlying; p. 403, l. 18, for thiry read thirty; p. 403, next to last line insert comma after rain; p. 406, l. 2, for to read the. The same editorial oversight allowed the diagrams on page 403, 404 and 405 to be so much reduced as to nearly destroy their legibility.

THE EDITOR.

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